

National Aeronautics and Space Administration

Office of Biological and Physical Research

**BIOLOGICAL AND PHYSICAL RESEARCH
ADVISORY COMMITTEE**

October 25-26, 2001

Washington, DC

MEETING REPORT

Bradley Carpenter

Bradley Carpenter
Executive Secretary

Kenneth M. Baldwin

Kenneth M. Baldwin
Chair

**BIOLOGICAL AND PHYSICAL RESEARCH ADVISORY COMMITTEE
NASA Headquarters
October 25-26, 2001**

**MEETING MINUTES
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**BIOLOGICAL AND PHYSICAL RESEARCH ADVISORY COMMITTEE
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Thursday, October 25

Welcome/Chair's Review of Agenda

Dr. Kenneth Baldwin, Chair of the Biological and Physical Research Advisory Committee (BPRAC), called the meeting to order and welcomed members and attendees.

Review of BPRAC Recommendations

Dr. Bradley Carpenter, Executive Secretary, reviewed the BPRAC recommendations and open actions from the prior meetings. There were fourteen separate recommendations from the last meeting. Most of them fell into two theme areas: research funding (the consequences of budget reductions) and ISS crew complement size (the lack of crew time for research activities with the 3 crew scenario). In addition, there were several recommendations of a more general nature. Dr. Carpenter provided a written response on each of the recommendations. He invited the BPRAC to provide additional comments on any responses that it felt were not sufficiently addressed. Dr. Baldwin noted that several of the recommendations were brought forward to the NAC. He asked the Committee to look at the responses and indicate if further comment was needed.

Office of Biological and Physical Research (OBPR) Program Overview

Dr. Kathie Olsen, Acting Associate Administrator, provided an update on the current status of the Enterprise. As a result of activities last year, the transfer of the International Space Station (ISS) research account (for research hardware, integration, and operations) was accelerated and is now in Code U. OBPR has a strong ground-based program, and OMB provided Code U with its requested budget. The Enterprise is in the process of transferring the four Commercial Space Centers (CSC's) in Code R to Code U. FY2002 is a transitional year for the Enterprise. It is currently planning for a 3-person crew; however, the House provided direction to maintain the research direction consistent with a 6-person crew. NASA is waiting on conference to provide the Agency with the FY02 bill. There is an additional \$50 - \$60 million for the ISS research account in the appropriations bill. Word this morning is that the conference bill has been mostly settled and that this money is still in the bill. OMB has not protested the Congressional action. However, OBPR took a cut in ISS funding in FY2002, and there is a shortfall of about \$50 million, even with the additional funds. Termination notices have already been sent out and the Centers have slowed some activities. A Basis-of-Estimate (BOE) on the entire program is due in October. An independent study of the Payload Operations and Integration Center (POIC) is underway. Even with the additional \$50 million, OBPR must further reduce FY02 activities in order to meet the President's budget run out. There have been a number of independent reviews, including the Strategic Resources Review (SRR), which looks at where NASA will be in 2010, the ISS Management and Cost Evaluation (IMCE) Task Force, a National Research Council Task Group on Research on the ISS, and a House Appropriations Committee Survey. The goals and challenges for the next year are: managing the ISS research budget to optimize science return; begin establishing the Non-Governmental Organization (NGO) for ISS; and replanning the research program for the out years (including assessment of other platforms for Code U research).

Dr. Olsen showed the total R&D baseline budget and the breakdown between research and technology and flight programs and ISS research. The Office does not yet know what the actual FY02 budget will look like. Currently, there is language that directs NASA to develop an interim research plan that protects the option to return to the research plan formerly envisioned (the 6/7 crew). With respect to earmarks, Dr. Olsen is working on an "education" campaign on NASA's peer review process. It is possible that the conference reports will produce even more earmarks. Dr. Olsen has stated that the earmark activities will go through the peer review process. She showed the latest statistics on NASA Research Announcements (NRAs). Dr. Olsen requested BPRAC advice on how to proceed on STS-107 (primarily, an OBPR mission). This mission has experienced chronic slippages and has now slipped to June 2002. Any slippage will come out of the ISS research account (\$1-\$2 million per month). The issue is whether it should be canceled or whether Code U should continue to pay the cost of slippage if it goes beyond the June timeframe. The Agency policy is that the users pay for the slips. (OBPR did not concur with this policy.)

Dr. Olsen intends to bring the issue of the costs to the attention to the Capital Investment Council. The Principal Investigators (PIs) on this mission are meeting at JSC; Code U will distribute informational material on the investigations to the BPRAC. If this mission is canceled, the money can go to ISS research hardware. Mr. Daley noted that there would be termination costs. Dr. Olsen agreed and indicated that OBPR has not yet looked at termination costs, which are primarily associated with the carrier.

Dr. Olsen indicated that everyone on the BRPAC would be notified as soon as the budget is signed. If Code U does not receive the expected \$50 - \$60 million, Dr. Olsen will work with Dr. Baldwin and Dr. Faeth to set up a special BPRAC meeting. There has been some indication that the earmarks (about \$12 million) may be covered with additional funds. She assured the Committee that all of the research projects (including the directed earmarks) will go through peer review and that only high quality research activities will be funded.

Dr. Baldwin requested an update on the status of recruitment for the Associate Administrator position. Mr. Goldin has resigned effective November 17 and Mr. Rothenberg is retiring December 15. Code U is still in the process of identifying a leader for Code U. It is critical to get the right person in this position. Code U will be a major component of the way NASA is evolving. With respect to the NGO, Code U intends to move quickly into the procurement phase. There will be an open workshop so that everyone can receive information at the same time. With respect to the impact of the budget reduction on ISS research, Dr. Olsen indicated that she would provide the backup on the flight program. In physical sciences, there will be only one rack. There will be two biotechnology racks (due to the realignment of emphasis). Bioastronautics and the commercial programs are not significantly affected. The major impact is to fundamental biology. This program has been devastated. The SRR is looking at how to save money within the Agency; if money is saved, the highest priority will be to "buy back" the ISS research account.

OMB Perspective

Mr. Doug Comstock discussed the overall federal and NASA budget and some of the recent decisions and the factors shaping them. When the FY02 budget was put together, the country was looking at a \$5.5 trillion surplus. In the FY02 budget, there was about \$26 billion for new initiatives above the FY01 budget. The campaign initiatives added to about \$15 billion (none related to NASA). In the top 20 agencies, many took significant reductions, but NASA had a 2% growth. Mr. Comstock showed how national R&D priorities have changed over time. One of the issues that OMB tracks is the number of earmarks. NASA's trend in earmarks has been increasing in both number and value. In order to fund these earmarks, the Agency often has to curtail other activities. Mr. Comstock showed the historic growth in the ISS budget since 1995. Over the last year and a half, the estimates have changed significantly. The ISS reserve history has had a disturbing downward trend. Development and operations have grown by about 80% relative to the FY01 budget. The decision on ISS was based on three goals: permanent human presence, accommodating the international partners, and enabling world-class research (defined as better than anything done previously in space). One of the areas where more money was brought into the program was funding from the Crew Rescue Vehicle (CRV) account. To offset the \$4 billion in growth in Station, three big high risk elements were discontinued, the research program was aligned with the new on-orbit capability, and NASA was directed to pursue other savings through Human Space Flight (HSF) efficiencies. No one wanted to preclude add-back of capabilities over time. Possible future enhancements were considered, e.g., providing additional crew. A number of management reforms were discussed in the blueprint. Mr. Comstock offered to provide copies of the OMB Deputy Director's Testimony before the House Appropriations Subcommittee in May. As much emphasis needs to be put on managing costs as there is on technical performance. "Business as usual" must come to an end. The position of the Administration has not changed. The degree to which the Agency can get the Space Station program under control will affect future actions on the Agency as a whole. Mr. Comstock showed the NASA/OMB budget "agreement" that was reached in June. One of the charges given to the IMCE Task Force was finding offsets and savings. Buy back of research is a top priority.

Currently, there are two priorities: defense and homeland security. Everything else is secondary. There is an economic stimulus that is working its way through the Hill, but this is focused more on tax cuts rather than increased spending. The IMCE Task Force was asked to understand the cost and validate the budget estimates, determine the additional offsets necessary, look at opportunities to enhance research, and

consider whether NASA is making the management changes necessary to get the cost in hand for the future. The Task Force report is due November 1. In response to a question regarding the \$4 billion growth, Mr. Comstock indicated that there were a number of “liens and threats” that were discounted by about 50%; also, there was additional content that was recognized after actual operations started. The \$4 billion was the result of a detailed bottoms up review that addressed these items. OMB is hoping to see an advance warning system come out of the management changes. Given the other priorities in the country, it will be very difficult to justify additional spending for NASA.

Mr. Baldwin noted that by and large, there is essentially no science program that can be carried out on the Space Station. Given this, what does the Congress do to justify the continuation of the Space Station? Mr. Comstock disagreed with some of the assertions. The crew for the second increment exceeded 20 hours per increment, even during a very busy time on Station. Dr. Jessup pointed out that most of this was on the crew “personal” time, not during the normal work week. The planned research time is minimal. The Committee is concerned that the research time depends on the relationships with individuals and reflects an uncertain degree of commitment. It is difficult to figure out what the irreducible minimum will be. Dr. Spaulding noted that the budgeted time is 5 hours per week. Dr. Bartoe clarified that was the number in June; since then, the track record has been substantiated as much better than that. Mr. Comstock indicated that he was interested in hearing from the Committee on its position on the research strategy, i.e., whether to focus on high priority science, or do a little of everything at a lower level. Dr. Baldwin observed that 80% of the research that was originally baselined (before the reductions) has been lost. This is a formula for failure. Dr. Faeth noted that the key difficulty facing Station is lack of crew time. The Committee has not heard about alternatives to improve the crew time over this period, e.g., extended Shuttle missions. It seems that engineering steps could be taken to improve things and the Committee needs to hear about them. Dr. Comstock noted that NASA is looking at several options, e.g., Soyuz overlap and commercial options to provide capability for additional crew. The Task Force has been asked to look at the viability of the cost of some of these options. OMB has been careful in its guidance to NASA. It does not want preclude options for the future. Dr. Olsen added that NASA is getting some exciting, unpredictable results from the experiments to date. Dr. Bula also noted that there are some commercial projects on the Station that have been very successful and perhaps some lessons could be learned from them.

Division Director Reports

Dr. Liskowsky provided an update on Fundamental Space Biology. In FY01, 169 PIs were supported—142 ground and 26 flight. About 66% of the total budget goes to these PIs. The annual solicitation for ground research will be released on October 31. Other peer review activities include a Biospecimen sharing plan (rodent tissues) for STS-107 and the 2001 International Life Sciences Research Announcement. NASA received 52 proposals; about half of those are fundamental biology. In terms of the ground-based program, the fundamental biology program is fairly healthy within the context of the budget. The biggest issue is access to space. The STS-107 launch date has slipped from August 2000, to June 2002. The R2 mission is currently manifested in the 2004/2005 timeframe, but funding to support this mission is not in the OBPR budget. Unless directed otherwise by Congress, activity on this mission will be stopped this year. There are two experiments that are scheduled to go up in November 2001 and March 2002. Experiments beyond that timeframe are under review and launch dates are TBD. Consideration is being given to early flight of ESA’s Biolab in the US lab. If this is deployed in the 2003/2004 timeframe, it would accommodate some of the experiments. The Division is developing options on possible budget, crew size, and resource scenarios. The goal is to develop a research program that will be as robust as possible with the resources that are available. The Division has initiated an Independent Cost Assessment of the Space Station Biological Research Project. The results will be briefed to the OBPR Associate Administrator on December 15. The Division is also looking at other flight platforms that could complement ISS research, e.g., free flyers. A technology demonstration of a bioexplorer “picosatellite” could be launched in the 2002-2003 timeframe. Another example of a free-flyer opportunity is the Bion mission. NASA is currently in negotiations with the Russians and ESA to fly a 20-day mission in 2004. Ames Research Center (ARC) has been asked to take a look at adapting some of the middeck hardware to use on EXPRESS racks, and studies are in progress. Technologies could be transferred from Neurolab to Bion, but engineering work would have to be done.

Dr. Guy Fogleman discussed the status of the Bioastronautics Research Division. This includes the research necessary to support humans on orbit. The two major programs in the Division are Biomedical Research and Countermeasures (BR&C), and the Advanced Human Support Technology (AHST) program. Most of the hardware is already built. About \$22 million has been transferred from Code M as part of the ISS research transfer. Research is done under R01 type of individual research projects, and team studies via the National Space Biomedical Research Institute (NSBRI). The Countermeasure Evaluation and Validation Project (CEVP) is up and running. The next NASA Research Announcement (NRA), to be released next week, will be a consolidated research announcement for all of these areas. Currently, there is a mix of observational and countermeasure validation studies ongoing on ISS. The “research” and “operations” budgets are separate and rules are being developed to manage the funds in the accounts. The historical action has always been to protect the research portion. Dr. Olsen invited advice from the BPRAC on these rules. On the AHST program, the development of the BIO-Plex facility has been deferred for about 18 months. A number of technologies are in the pipeline. The first facility rack for human research was delivered to the Station in February 2001, and flight experiments are ongoing. Selections have just been made on the annual AHST solicitation. The Division is conducting a competition for a new NSCORT for Advanced Life Support and proposals are currently in review. As noted earlier, the NRA for BR&C is planned for release on October 31.

Dr. Trinh provided an update from the June meeting. There is an ongoing NRC study on Microgravity Research. A Materials Science Workshop on Advanced Materials for Propulsion was held earlier in the month. A Science Concept Facility Review for the Biotechnology Facility was held at JSC in early October. Dr. Trinh discussed some of the experiments on ISS—a flight experiment on colloid physics, an experiment on protein crystal growth, and cell culture experiments. There have been several recent science press releases from the Physical Sciences program. There is a new program at ARC—Biomolecular Physics and Chemistry—and 14 proposals have been selected for funding. Thirteen proposals have been received from academic institutions in response to the Cooperative Agreement Notice (CAN) for a NASA Bio-science and Engineering Institute. The major issue in Physical Sciences is the ISS research budget. The program has a 68% decrease in funding for FY02. At this point, one entire science discipline has been eliminated (combustion research) and the facility racks have been reduced from 9 to 5. Flight investigations have been significantly reduced and the flight rates of the EXPRESS rack and the microgravity science glovebox have been significantly reduced. There is a current shortfall of \$9-\$20 million to carry out the reduced content program. Another issue is the potential growth in cost of STS-107, as noted earlier. There is an issue of what to do with the flight investigators that have already been selected. Dr. Trinh invited Committee advice on this. He presented a few concepts for consideration. The Division is assuming that the investigations selected are of “world-class” category. It proposes the following: to maximize utilization of all available ISS facilities by implementing cross-disciplinary sharing; increase the ratio of ground-based research to flight experiments by using a moratorium on flight investigation selection; use resources from the research budget to solve short-term issues in the ISS research budget; and implementing a fast-track technology program to develop next-generation capability, emphasizing remote operations and automation.

Lunch Science Presentation

During lunch, Dr. Gerard Faeth gave a presentation on the opportunities and challenges of combustion science in microgravity. He discussed the relevance of combustion science to society and described a laminar soot processes experiment in microgravity. Soot in flames is a major unresolved combustion problem having significant relevance to society. Soot particles are a public health problem and deposit in the airway and lungs. Non-buoyant laminar flames in microgravity are the right paradigm for soot research. Understanding the hydrodynamic effects on soot growth and oxidation could yield new ways to reduce particulate and pollutant emissions. Fire and explosion hazards in spacecraft are increased compared to Earth, but little is known about them. In response to a question, Dr. Faeth indicated that smoldering fire is an area of research that NASA should focus on. This is a likely type of fire situation on orbit and has practical terrestrial applications.

ISS Status

Mr. Dan Hedin provided an update on ISS. Over the last year and a half, there have been 16 missions and Space Station has performed substantially as planned. Expedition 3 is continuing systems outfitting and

on-orbit research. The US airlock (July 2001) completed Phase II. The Russian Docking Compartment was delivered to orbit in September. Over the last year, schedules have firmed and held to within weeks of schedule. Three person crews rotate about every 90 days. What's ahead is the first Utilization Flight (November 2001) and the power block construction (the integrated truss system) in 2002. About 97% of the hardware has been delivered to KSC. The technical risk has declined substantially and there is a lot more dwell time in the orbiter schedules. The delivery of the international elements begins in late 2003. The CRV is in question; the Program is sustaining critical skills in this and the Environmentally Closed Life Support System (ECLSS). However, NASA does not have authority to go forward with the build of these systems. NASA must demonstrate that it can maintain cost to the FY02 budget. At this time, there is about \$500 million shortfall with the budget profile. This issue has been addressed with the IMCE Task Force. The Task Force was chartered in August and will deliver a draft report November 1. That report will be delivered to the NAC, which is scheduled to meet December 6. The report will be released publicly for comment prior to the NAC meeting and deliberations will occur at that meeting. Dr. Olsen noted that the BPRAC would get a copy of the report when it is made public. There are five scientists on the IMCE Task Force. Most of the discussions have been focused on cost control; however, there has been a very clear emphasis on maintaining and enhancing research capability. The Task Force was challenged to determine mechanisms to enhance research (without cost growth), including options to increase crew size to 6/7. It is also looking at whether NASA has the right program management approach. NASA must demonstrate cost control and credibility on the Program before any augmentations will be considered. In response to a question, Mr. Hedin indicated that a large part of the cost growth can be attributed to schedule delays, both ours and our partners. Code M has instituted a new Cost Assessment Office at JSC and changes in the management office have been made. Development is continuing to come down as a percentage of overall annual cost. The opportunities to save money are not in development; they are in operations, e.g., new ways of doing business and levels of sustaining engineering.

ISS Research Status

Dr. Olsen discussed the status of ISS research. Delivery of the US Lab in February 2001 set the stage to begin significant levels of ISS research. Expedition 1 conducted some US research activities; Expedition 2 began a more robust program of research and Expedition 3 is continuing the Lab outfitting and scientific research. Five research racks are on orbit. By the end of 2002, 10 research racks will be on orbit and about 60 experiments will be completed or in progress. There are a lot of non-science constraints that OBPR must deal with—earmarks, budget, crew size, the number of launches, past decisions, etc.—in developing the Research Plan. OBPR is adjusting the program of ISS research to take account of two major reductions in resources: the \$1 billion reduction in the ISS research budget and the reduction in available crew time. In the event that the crew does not expand beyond 3, the hours available for the performance of research tasks are currently estimated to be 20 hours per week for all users. OBPR is developing a series of options to carry the original program as well as various de-scoped versions. A research program fitting the 3-person crew constraints is being developed using a process assessing all the on-orbit resource availability, establishing new scientific and technological priorities, and including the final disposition of the FY02 budget. In response to a question, Dr. Olsen stated that any new barter will have the appropriate people from the science community at the table. Dr. Olsen described some of the actions that OBPR is taking to increase efficiency, leverage resources and other major efforts, maximize operations, and expand co-funding of research by other agencies. Some options are: shut down research for 1-2 years; enhance telescience capability; restrict bioastronautics crew research to advanced countermeasures development; use Extended Duration Orbiter (EDO) and increments creatively; and develop additional free flyer capability. Dr. Olsen invited ideas and comments from the Committee. OBPR is using a qualitative approach to assessing costs and benefits, and Dr. Olsen requested help from the Committee on the prioritization. In response to a question, Dr. Olsen indicated that she was confident that OBPR would have a strong physical science program. The commercial programs have always included automation and there will be those aspects. What will be hurt is the Fundamental Biology Program. NASA will look into how it can use ESA's biology facility. Hopefully, Code U will not have to go to that. NSBRI is primarily a ground-based program focused on countermeasures. Although the Expedition 2 crew was very dedicated to performing research and was able to do more than planned, Dr. Baldwin noted that as the Station is built out, crew responsibilities for Station maintenance and operation will increase and time available for research may decline or "float." Dr. Olsen noted that until 2004, OBPR had selected experiments that would fit a 3-person crew. The international partners will play a major role and they are demanding a 6-

person crew. Dr. Baldwin expressed serious concern about the plant, animal, and cell biology research capabilities. These programs are in dire straits. Dr. Olsen invited Committee advice on what to do with respect to prioritization. Dr. Carpenter observed that the BPRAC is not really well-constituted to judge priorities, because most of the members are NASA-funded and have vested interests. However, this Committee could recommend the process. Dr. Jessup suggested organizing a team to set up a public, external workshop (including non-NASA funded scientists) to address the ISS research priorities within the existing budget. OBPR needs a plan that can fit the different contingencies to what the program can do.

Space Product Development (SPD)/Research Integration

The third annual Space Station Utilization Conference was held last week in Florida. About 90% of the planned papers were presented and the conference was an outstanding success. Next year will be the World Space Congress (held every 10 years), and three days will be devoted to ISS. A major effort is underway to look at payload operations. A team has been assembled (payload specialists and retired operations directors from MSFC, GSFC, and JSC) to assess payload operations and how it can be downscoped. This group is firmly committed to reduce the cost of operations through a new approach. The results of this study will be used as an input to procurement activity on the NGO. Mr. Uhran discussed the status of the NGO. NASA missed the September 30 deadline to Congress for the implementation plan. The internal group reported to NASA in June. A copy of the report will be provided to the BPRAC. It does not give the solution to the problem (a specific structure or responsibilities of an NGO). It audited all of the functions associated with utilization of the Space Station and dis-aggregated those functions to the lowest level of detail over a five year horizon. The team bracketed the problem by developing a conservative case (few functions transferred) and an aggressive case (many functions transferred). A senior team took the 20 top functions and allocated them into three categories: those functions that are inherently governmental; those functions that have the potential to be assigned to an NGO in a support role; and those functions that have the potential to be assigned to an NGO in a leadership role. This has been submitted to NASA management for review. The implementation plan will be submitted to Congress around the end of November. It will then be a public document. It will provide the top level approach to procuring the activity and the potential roles and missions of the NGO. There will be a separate report to the appropriators in November. Assuming the Administration and the Hill are supportive, NASA will enter a formal procurement phase. Mr. Uhran stressed that the internal study team report was submitted in June; the internal recommendations are not the final solutions.

In order to prioritize the research program, NASA has taken or is taking the following actions: a memo to JSC to benchmark the cost, schedule, and content of the program, including the BOE (one of the leading things the IMCE is looking for on the vehicle side); going through each of the items of content and determining the validity of the BOE, and repricing some of the items with a more valid estimate; setting up a configuration management process for the budget; and determining an executable program. The prioritization effort will be extremely important. OMB and the Hill will look very closely at the BOE and whether it is valid, the capability for independent cost assessment, and how change is managed in the budget process.

Mr. John Emond summarized the status of the ISS commercial research payloads. SPD is examining possible program alignment along market sector lines, e.g., agriculture, biotech, materials research. There are also some potential entrepreneurial initiatives that are under discussion. The SPD ISS profile remains fairly consistent. If there is a 3-person crew steady state, no particular research thrust would be dropped, but the number of re-supply missions or the number of deployments of transient payloads could be reduced. However, reduced access to space (fewer flights) could seriously affect SPD. Mr. Emond described the commercial experiments on Increment 0, Expedition 2, and Expedition 3, and the payloads planned for future expeditions and utilization flights (through 2002). Downstream (2003-2005), additional ISS payloads are projected. Flight access constraints could impact deployment of any of these. Metrics are identified on the web site: cscsourcebook.nasa.gov. In response to a question, Mr. Emond indicated that there have been instances of collaboration between the science and commercial communities, and SPD stands ready to collaborate. Dr. Fuller encouraged a mechanism for collaboration or interaction prior to initiation of hardware.

Subcommittee Reports

Dr. Jessup reported on the last Space Station Utilization Advisory Subcommittee (SSUAS) meeting in July. The first recommendation was for Code U to develop a long-term science plan and prioritization of science on ISS. The second recommendation concerned financial reserves and recommended the ISS program manager secure a stable funding plan with appropriate reserves. Another recommendation suggested commercial resources be used on the science side. Another related to budget administration (a briefing on the process). The SSUAS made a recommendation on external payloads (develop contingency plans for use of attach points). There was another recommendation concerning research grants management (similar to the BPRAC recommendation). The SSUAS recommended that NASA fence the ISS research budget against incursion. The most important recommendation was the long-term science plan and prioritization.

Ms. Porter reported on the Commercial Advisory Subcommittee (CAS) meeting via telecon on October 5 and again on October 24. The CAS discussed how to integrate the development of hardware for science experiments. The staff has worked on disseminating information on this hardware. The CAS applauded this and encouraged further effort. The CAS also encouraged a new management approach for performance measurement.

Dr. Musgrave reported on the Life Sciences Advisory Subcommittee (LSAS) meeting. The Subcommittee had not met for almost a year. It focused on biomedical research areas and NASA/NIH interactions. The LSAS received a presentation on the education efforts; they are well-thought out and are being implemented. The new curricula should become major tools for education and the LSAS was very favorably impressed with the activity. The LSAS felt that a “world-class research” program will not be possible on the Station without facility class hardware, i.e., the centrifuge. The planning that has gone into the centrifuge and the animal habitats represents this community’s concept of what is needed to provide world-class research. There was great despair in the committee that we are making a major step backward. If full funding is not restored, the LSAS recommended termination of all flight hardware. Bion and Biosatellites should be discouraged. Cost savings should be transferred to a robust program on the Shuttle that complements an enhanced ground-based research program. Future ISS activities should only be considered when funding is restored. The LSAS requested more information on the external review and rescoping of the critical path roadmap that is going on at JSC. Dr. Olsen indicated that she was unaware of any changes and would obtain more information on this review. Dr. Baldwin requested that a full presentation be given to the Committee.

Dr. Russel reported on the Microgravity Research Advisory Subcommittee (MRAS) meeting. It focused on five issues: on the rationale for the selected reductions in the plan; a strategic plan for implementation of the research program; broadening the scope of the program; the ratio of ground to flight investigations and the flexibility to accomplish multidisciplinary projects; and budgetary problems beyond FY02. The Subcommittee was not convinced of the value of short-term funding of the ISS research program with non-ISS research funds. The Subcommittee felt the need to change how it operates in the future—more time for dialog and less time spent on formal presentations.

Dr. Baldwin summarized the major issues:

The status of STS-107 – can life sciences stay the course or is the budget too fragile? There is significant concern about the STS-107 slips. Congress has mandated this research flight and the NRC has recommended this flight opportunity. It is essential that the June 2002 launch date be maintained. This mission is extremely important to the community. The cost of these delays is causing serious detriment to the program. This is a NAC issue.

The Committee was pleased with the potential augmentation of \$50-\$60 million for ISS research. However, the restoration of funds in the out years is essential.

Long range ISS research implementation strategy. The SSUAS has a good recommendation on this and the BRPAC supports it.

Common facilities between the commercial and science programs. The two entities should be communicating with respect to how facilities, e.g., a combustion facility, a plant growth facility, and a habitat for animals, could be used for both programs.

Earmarks. If there are earmarks, they should meet peer review.

Dr. Baldwin noted several other recommendations from LSAS and MRAS.

Friday, October 26

Dr. Baldwin noted that the Committee might need to have some interim telecons regarding OBPR's strategic plan on ISS research.

Institute of Medicine (IOM) Report

Dr. Richard Williams distributed copies of the IOM Report and highlighted the key elements in the Committee's recommendations. A few years ago, Mr. Goldin asked the IOM to look at the health care system with an eye to making it support long duration human spaceflight missions beyond low Earth orbit. The report is available on the Web and from the National Academy of Sciences (NAS) press. NASA received the report on October 19, 2001. NASA has pledged to work with the Committee in an ongoing fashion to implement these recommendations. There were recommendations in seven major areas:

1. Managing and Communicating Risks to Astronaut Health: NASA should give increased priority to understanding, mitigating, and communicating to the public the health risks of long-duration missions beyond Earth orbit.
2. Comprehensive Astronaut Health Care System: NASA should develop a comprehensive health care system for astronauts for the purpose of collecting and analyzing data while providing the full continuum of health care to ensure astronaut health.
3. Strategic Health Care Research Plan: NASA should develop a strategic health care research plan designed to increase the knowledge base about the risks to astronaut health.
4. Understanding Behavioral, Social and Cultural Issues and Challenges: NASA should give priority to increasing the knowledge base of the effects of living conditions and behavioral interactions on the health and performance of astronauts on long-duration space missions.
5. Astronaut Health and Safety Data Collection and Access: NASA should develop and use an occupational health model for the collection and analysis of astronaut health data, giving priority to the creation and maintenance of a safe work environment.
6. Integration of Engineering and Health Sciences: NASA should accelerate integration of its engineering and health sciences culture.
7. Authority and Accountability for Astronaut Health: NASA should establish an organizational component headed by an official who has authority over and accountability for all aspects of astronaut health, including appropriate policy-making, operations, and budgetary authority.

NASA embraces all of these recommendations. With respect to the recommendation on behavioral issues, JSC has increased its psychiatric staff and there is increased attention to behavioral interactions. NASA will need the help of the BPRAC on the best way to approach the recommendation on data collection and access. Code U owns human research; Code M owns the responsibility for astronaut care; the Office of CMO owns policy and oversight. At the point of implementation (JSC) there is a completely different paradigm. At that level, the flight surgeons and researchers all work for the Space and Life Science Directorate, and there is no line authority over the flight surgeons and researchers. NASA has to find the best way for the organization to be configured, recognizing that funds flow through the Enterprises. NASA HQ and JSC will be devoting a lot of effort to these recommendations. In response to a comment, Dr. Williams noted that NASA is already doing a lot of what is in the recommendations, but it can be done better. Dr. Harris noted that NASA may be doing some of the recommendations, but it is not doing it effectively. He suggested that the BPRAC look at the conclusions in the report to gain some insight into the issues. Dr. Williams agreed that the Committee needed to read the entire report, not just the Executive Summary. The BPRAC was very impressed with the IOM report and welcomed its recommendations. It

looks forward to an engaging response from NASA. In response to a question, Dr. Williams noted that the international aspect of the crew on Space Station adds an additional level of complexity. NASA will have to establish the lead in addressing these recommendations. This will be communicated to the international partners on several levels, e.g., the multilateral medical operations panel and the multilateral medical policy board. This will enable flow into the larger venues for discussion by all partners.

Dr. Baldwin took the action to accept the report and make an appropriate response on behalf of BPRAC.

NSBRI

Dr. Faeth chaired the Committee in discussion of this topic (Dr. Baldwin recused himself from the discussions).

Dr. Alford briefed the BPRAC on the status of the NSBRI. He noted that the NSBRI is beginning its fifth year of support. He addressed the Institute as it is today, the achievements over the first four years, and the site visit review of the program by the Chief Scientist. The mission statement has been modified to frame it more in the context of NASA's mission statement and objectives. The NSBRI is a partnership among NASA, academia, other federal agencies, and industry. The focus of the NSBRI is on exploration mission risks related to human health and performance. The aim, through research, is to develop countermeasures, ways of monitoring and diagnosis, and treatment. The research teams are integrated and must respect the relationship with all of the partners. The academic consortium is the steering group; it will be expanded in the future. The research program currently consists of 12 research teams, comprising 87 research projects and 7 education/outreach projects. The projects involve 72 institutions from 20 states with over 250 investigators. The FY01 funding was about \$25.5 million. The FY02 budget is expected to be about the same. There are cooperative national research initiatives with the NIH as well as international research affiliations.

Dr. Alford noted some selected accomplishments. The NSBRI started at the countermeasure readiness level (CRL) of 2 and 3; it has now progressed to 5 and 6. (When the readiness level is 7, it is turned over to the NASA for spaceflight). Dr. Alford showed the list of the current consortium members and the research teams and team leaders. The consortium members were selected via national competition. Four new teams were added in the fourth year of the Institute and they are well underway. Independent consultants have reviewed the NSBRI programs. They have stated that the proposals reflect a strong countermeasures program. Most tasks are strongly supported by the NRC committee. NSBRI has leveraged funds in a very effective way. Investigators have competed successfully for funds from other agencies and there have been funds from private organizations and foundations. From the beginning, the NSBRI has required that the institutions that receive funds must cost share 10% of the funds they receive. Many new investigators have been brought into the NASA program.

Dr. Alford discussed the site visit report. He noted that the site visit was much appreciated by the Institute. Many of its recommendations pertained to the operation of the Institute. The NSBRI response was prepared in cooperation with JSC and NASA Headquarters. There were a number of positive statements. The Review Committee found that the NSBRI provided added value and recommended that the Institute continue for its second five-year period. The Committee was impressed by the scientific strengths of the NSBRI and its leadership. It recommended that the NSBRI continue to serve as a team-based organization whose primary purpose is to develop countermeasures. The relationship with JSC is outstanding. There are adequate checks and balances provided by the Board of Councilors and the Scientific Council. Priority setting and development of schedules have been impressive. The Committee made specific positive comments on each of the teams. The NSBRI activities enhance the ongoing biomedical research. The Committee was impressed with NSBRI's alliances. The Committee recommended that the NSBRI expand its educational program to the university level. The NSBRI agreed with this recommendation and plans to offer graduate programs. With respect to the Strategic Plan, the NSBRI is in the third iteration of the Plan. This will be presented to the Board of Directors in November. The Strategic Plan will continue to evolve. Dr. Olsen's perspective concerned the Strategic Plan. Conflict of interest with regard to Team Leaders has been a concern since the beginning. The NSBRI did not only include investigators from the consortium in its research plan; investigators were competitively and openly selected. In the future, NSBRI will take the Team Leaders out of the picture and select them on the basis of proven abilities, managerial skills, and

concepts. There was a perception that the NSBRI took the funds and divided them among the 12 teams. This was the case in the beginning, but as time went on, there was prioritization of efforts. The teams are not uniformly supported now and it is NSBRI's intention to support teams based on prioritization in the future. There is a need to have some five-year projects. It is important to have effort in all of the areas; however, there needs to be some flexibility. Another perspective concerned the Integrated Human Function Team. The review committee was not very impressed with this new team. NSBRI was concerned about this and conducted a workshop on the issue. The report was made available to the Council. The Team will be terminated as such, but the value of their work will be blended into other teams. However, there is value to having an office within NSBRI that focuses on the importance of the integrated human function. Although there was no disagreement with the spirit of the recommendation, there was a concern with the site visits' recommendation of a three-year review of the Teams and how this would be managed. The technical problem is that the Teams were not all launched in October last year; many did not get launched until April because of funding uncertainties. These Teams will not have had enough time to get going. NSBRI believes that access to medical data is extremely important and the Institute welcomes the IOM recommendation.

In response to a question about CRL, Dr. Alford noted that no countermeasures are at CRL 7. Dr. White noted that the average is around 4.5. There are a number at 5 and 6. Progress at the rate of 2 CRLs per project is expected. The Program is converging on a high level of readiness. The next step is the CEVP. There should be a number of competitive projects from NSBRI that will be submitted to the NRA. An obvious gap in the program is exercise; it is clear that there is not an integrated exercise program with JSC. NSBRI called for this in its NRA, but did not get proposals of appropriate quality. A number of steps are being taken to coordinate exercise efforts with JSC. Dr. Young noted that one of the things that has become apparent is that exercise should not be considered independent of other approaches. Exercise is not likely to be the single answer—it will be combined with other countermeasures. Dr. Brady noted that the NASA-NIH Subcommittee had not heard about the collaboration with the NIH. He indicated that the Subcommittee would like some details about the projects. In response to a question regarding the interaction with the operational medical support, Dr. Alford indicated that there is not a formal relationship. The NSBRI participates in debriefings of ISS crew, and it has sponsored a workshop on evaluation. The medical operations for the astronaut are independent of the NSBRI. However, the informal interaction is growing. The NSBRI would like to see a stronger relationship.

Dr. Alford noted another important issue that was raised by the review committee. It concerns the diversity within the Institute. NSBRI would like to have more women and minorities on its Board. There is diversity in the research teams, although it could be better. The advisory council is representative and reflective of diversity. NSBRI is seriously working this issue. With respect to the research program, Dr. Olsen noted that the new announcement is going out through NASA Headquarters. Dr. Alford noted that the NSBRI system has many analogies to the NIH system. Dr. Young added that the NSBRI has a goal-directed mission. One of the challenges is responding to the focused mission while spreading the net widely for peer-reviewed proposals. This is the challenge that is faced by the Team Leaders. To respond to the goals, some of the selected projects need to have an adjustment in emphasis. The percentage acceptance rate for the last competition was about 30%. The rates vary by discipline; some were as low as 10%. With respect to budget, Dr. White noted that the \$5M formerly from Code M has disappeared. Dr. Alford indicated that the NSBRI would like to have the Team progress reviews at the fourth year because of the delayed start-ups. Dr. White indicated that in the next round of competition, there will be a consolidated review for all of the proposals in response to the NRA. The same panels will review institute proposals and NASA proposals. The same contractor that manages the Code U peer review manages the NSBRI peer review. The same protocols and procedures are followed. There are two different submissions system involved—the NSBRI system is entirely electronic; the NASA system is entirely paper. However, a researcher cannot submit the same proposal to both. There is a uniform set of quality measures for all proposals. Program relevance (to NASA or to NSBRI) is evaluated separately, but selection is coordinated. Dr. Young stated that the Associate Team Lead works with the Team Lead in forming the program and the budget recommendations. The Associate Team Leads frequently represent the Team at conferences and workshops.

Dr. Tomko discussed the status of the response to the Chief Scientist' third year review of the NSBRI. He showed the NSBRI funding and sources from 1998 through 2006. As noted earlier, the Code M portion of the funding for NSBRI is at risk. NASA HQ has an important role to play in the NSBRI. It manages strategic planning and oversight of programs. Because of the large amount of money involved, NASA HQ is interested in the Strategic Plan. As noted by Dr. Alford, the NSBRI is in the process of preparing the Strategic Plan that is required to comply with the results of the Chief Scientist's review. Details of a coordinated research solicitation, evaluation, and selection have been worked out this year. NASA external science reviews of each individual NSBRI team is required every 3 to 5 years. This review process will be instituted in 2002. The plan is to review three teams each year, so each team will be reviewed every 4 years. Dr. Tomko indicated that he was pleased to hear how the NSBRI is responding to the Chief Scientist's site visit review. Dr. Tomko cited a potential countermeasure that the NSBRI accomplished at the CRL 7 level and is now ready for CRL 8 at JSC. Dr. Olsen indicated that the 3-year, site visit review is at the top-level. It is a management overview. From a HQ standpoint, OBPR must demonstrate that public money is used wisely. The site visit team felt strongly that the individual teams' progress needs to be reviewed in greater depth. Those reports can then be put into the overview picture.

Committee Discussion of Findings and Recommendations

The BPRAC discussed the following topics and developed findings and recommendations: earmarks; collaboration on shared use of flight hardware; the IOM Report on Medical Care Systems for NASA; the Fundamental Biology Program; alternate flight platforms; the strategic plan for ISS research and science prioritization; multidisciplinary collaborations; the balance between flight hardware and research budgets; BPRAC meeting logistics; budget administration within Code U; the STS-107 research program; the potential funding increase for ISS research; and the NSBRI. The BPRAC was very pleased with the progress on OBPR educational and outreach functions. The recommendations on earmarks, the Fundamental Biology Program, the strategic plan for ISS research and science prioritization, the STS-107 research program, and the potential funding increase for ISS research will be carried forward to the NAC.

The final recommendations are included in Appendix D.

One of the agenda items for the next meeting will be the Critical Path Roadmap.

AGENDA

BIOLOGICAL AND PHYSICAL RESEARCH ADVISORY COMMITTEE (BPRAC) MEETING
American Management Association
440 First Street, NW
Washington, DC
October 25-26, 2001

THURSDAY – October 25, 2001

10:00 A.M.	Welcome/Chair's Review of Agenda/Logistics	Dr. Baldwin
10:10 A.M.	Review of BPRAC Recommendations	Dr. Carpenter
10:30 A.M.	OBPR Program Overview	Dr. Olsen
11:00 A.M.	OMB Perspective	Mr. Comstock
11:30 A.M.	Division Directors' Reports	
	Bioastronautics Research	Dr. Fogleman
	Fundamental Space Biology	Dr. Liskowsky
	Physical Sciences	Dr. Trinh
	Space Product Development/Research Integration	Mr. Uhran
1:00 P.M.	Lunch/Presentation – Gerry Faeth on Combustion Research at NASA	
2:00 P.M.	ISS Status	Mr. Hawes
2:30 P.M.	ISS Research Status	Dr. Olsen
3:45 P.M.	Break	
4:00 P.M.	Subcommittee Reports	
	Space Station Utilization	Dr. Jessup
	Commercial	Ms. Porter
	Life Sciences	Dr. Musgrave
	Microgravity Research	Dr. Russel
5:45 P.M.	Summary of First Day/	
6:00 P.M.	Adjourn	

FRIDAY – October 26, 2001

8:00 A.M.	IOM Report: Medical Care Systems for NASA	Dr. Williams
8:30 A.M.	NSBRI: Overview and External Review Committee Report	Dr. Olsen Dr. White
10:15 A.M.	Discussion and Committee Recommendations Comments and Agenda Review	Dr. Baldwin
12:00 P.M.	Adjourn	

BIOLOGICAL AND PHYSICAL RESEARCH ADVISORY COMMITTEE (BPRAC)
October 2001

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BIOLOGICAL AND PHYSICAL RESEARCH ADVISORY COMMITTEE**NASA Headquarters****October 25-26, 2001****MEETING ATTENDEES***Committee Members:*

Baldwin, Kenneth M. (Chair)	University of California, Irvine
Bigelow, Nicholas	University of Rochester
Bula, Raymond J.	[not affiliated]
Carpenter, Bradley (Executive Secretary)	NASA Headquarters
Daley, Thomas J.	Philadelphia Naval Business Center
Faeth, Gerard M.	University of Michigan
Freeman, Colette	National Cancer Institute
Gross, Leroy P.	INTEL MED, Inc.
Harris, Bernard A., Jr.	The Harris Foundation
Hill, Walter A.	Tuskegee University
Jessup, J. Milburn	University of Texas Health Science Center
McPherson, Alexander, Jr.	University of California, Irvine
Merrell, Ronald C.	MCV-VCU Department of Surgery
Musgrave, Mary	University of Massachusetts
Porter, Elsa A.	Meridian International Institute
Russel, William Bailey	Princeton University

NASA Attendees:

Emond, John	NASA Headquarters
Olsen, Kathie	NASA Headquarters
Charles, John	NASA/JSC
Juhans, Renee	NASA Headquarters
Shortz, Donna	NASA Headquarters
Crouch, Roger	NASA Headquarters
Erickson, Kristen	NASA Headquarters
Caruso, Gary	NASA Headquarters
Lee, Mark	NASA Headquarters
Robery, Judith	NASA Headquarters
Wargo, Michael	NASA Headquarters
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Ahlf, Peter	NASA Headquarters
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Uhran, Mark	NASA Headquarters
Liskowsky, David	NASA Headquarters
Trinh, Eugene	NASA Headquarters
Tomko, David	NASA Headquarters
McClain, Bonnie	NASA Headquarters

Other Attendees

Oman, Charles M.
Fuller, Chuck
Lees, Marjorie
White, Ronald
Neitzel, Paul
Kronenberg, Amy
Katovich, Mike
Bardos, Russ
Guastafarro, Carl
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BIOLOGICAL AND PHYSICAL RESEARCH ADVISORY COMMITTEE**NASA Headquarters****October 25-26, 2001****FINDINGS AND RECOMMENDATIONS*****Earmarks [to NAC]***

The BRPAC condemns in strongest terms the continued corruption of the peer review system by the insidious practice of “earmarking” funds. It urges Congress to lighten the heavy burden imposed upon the backs of honest, struggling scientists reliant upon the support of NASA to advance the frontiers of space science. Earmarks have seriously reduced the amount of funds for peer reviewed proposals and negatively impacts NASA’s ability to attract new investigators.

Recommendation: Any earmarks should go through the peer review process and meet the high standards of OBPR peer reviewed proposals. In the course of the peer-review, it should be made clear that earmarks are only funded for one year.

Collaboration on shared use of flight hardware

BPRAC commends the collaboration that was described between the commercial research/CSC and the fundamental science communities in the shared use of flight hardware. Such collaborative use of commercial flight capabilities for science research or science hardware for commercial research purpose is to be encouraged. The Committee would like to be briefed on continued progress on collaboration, particularly given resource constraints confronting OBPR.

Institute of Medicine Report on Medical Care Systems for NASA

Findings: The BRPAC was briefed on the Institute of Medicine’s report on Medical Care Systems for NASA. The BPRAC recognizes the depth, breadth, and impact of this report on medical care for the human presence in space.

Recommendations:

- 1) The BPRAC strongly endorses that NASA take the necessary steps to the finding and recommendation of the Institute of Medicine’s Report
- 2) The Committee requests regular reports on the implementation.
- 3) Areas of special interest include relationship of research and operational medicine and bioethical issues relative to astronauts as research subjects.

The BPRAC would like to be informed of the status of the advisory subcommittee (formerly aerospace medicine and occupational health) at the next meeting.

Fundamental Biology Program [NAC]**Finding:**

Budget restructuring caused by numerous ISS cost overruns has forced the delay or cancellation of critical hardware necessary to implement a “world class” research program that spans the disciplines of functional genomics, cell and molecular biology, mammalian biology, and human health. In particular the BPRAC condemns the loss of the Advanced Animal Habitat, Cell Culture Unit, Plant Research Unit, and Four-rotor Centrifuge.

Recommendation:

If adequate funding for the facility-class hardware for fundamental biology is not restored, the BPRAC recommends thorough reassessment of all development efforts for ISS flight hardware and the associated science efforts. Cost savings should be transferred to a robust science program that employs the space shuttle, the Spacehab Research Double Module, with EDO pallet and existing mid-deck flight hardware. The effort should provide annual flight opportunities on the space shuttle that complement an enhanced ground-based research program without prejudice to its budget. Future redistribution of science activities toward the ISS should be considered only when funding is assured to endow the ISS with a full research capability as defined by the Rev F assembly sequence.

Alternate Flight Platforms

Finding:

OBPR is examining options to enhance flight opportunities for their research community. Towards this end, OBPR presented possibilities to add additional flight platforms, such as free-flying (picosatellites and BION) satellites.

Recommendation: The BPRAC requests a review of the options (including a cost analysis) that OBPR is considering at the next meeting.

Educational and Public Outreach

The committee commends OBPR for its responsiveness to our recommendations to better define its educational and outreach functions. We are pleased to see the creation of leadership positions in the areas of Educational and Public Outreach. It has long been our position that many unique and effective educational programs have been developed at the field centers and within the various research opportunities sponsored by OBPR. The decision to coordinate these independent initiatives under the direction of the chiefs of Educational and Public Outreach will eliminate duplication. These integrated efforts will result in a more directed initiative to inform and excite our youth and general public about NASA's mission, accomplishments, and research. We believe that the new curricula and educational programs that are being developed should become major tools for education across the country and position OBPR as a proponent of building a lifelong learning society.

MRAS Findings and Recommendations for BPRAC***Multidisciplinary collaborations***

Finding: Physical Sciences has introduced new biologically related program areas emphasizing multidisciplinary collaborations. These include an intriguing array of new initiatives in biomaterials, biological physics, and biomolecular chemistry and physics.

Recommendation: The subcommittee encourages more complete integration of these biological initiatives into the overall NASA microgravity/physical sciences research program, with careful thought about the appropriate balance between the biological and physical sciences and the relationship of the new initiatives to microgravity and the NASA mission.

Finding: Physical Sciences has adopted an annual consolidated NRA, with the intention of encouraging multidisciplinary research and increasing the ratio of ground to flight investigators to significantly higher than 5 to 1.

Recommendation: The subcommittee supports this step and urges the division to be flexible in the level of funding, recognizing that multidisciplinary research requires funding levels that accommodate multiple investigators on a single investigation.

Balance between Flight hardware and research Budgets

Finding: The director requests the flexibility in the short term to utilize funding from the ground based research program to resolve short falls in the development of facilities for the ISS research program.

Recommendation: The subcommittee was not convinced of the merit of this step and recommends that it not be taken.

BPRAC Meeting Logistics

Finding: The subcommittee found that the format of its meeting allowed too little time for constructive deliberations on the many difficult issues facing the division.

Recommendation: Materials for presentations should be distributed electronically prior to the meeting, to minimize the time needed for presentations and facilitate informed input from the members. This will of course require members to prepare themselves ahead of time and to conduct some business remotely via email and telephone/conference. The ultimate objective is to advise more substantively and to be better able to inform the respective technical communities.

SSUAS/MRAS Recommendation on Long Range Planning for Science Prioritization on ISS [NAC]

Finding: The financial situation has forced deep cuts into the flight program, leaving uncertainty about the future scope of ISS research. Both the SSUAS and the MRAS are alarmed by OBPR's plans to curtail progress toward developing important facility-class hardware to support Fundamental Biology and Microgravity research on ISS. Large sectors of the traditional flight research community will be disenfranchised from using ISS if this research restructuring takes place. These disciplines include research areas crucial to providing the basic knowledge to support safe human habitation in space, such as combustion and fluids research, experiments with small animal models, and studies with large plants that could provide renewable food and life support functions. At this time, OBPR research priorities seem to be driven by changes in funding rather than by the initial premise of creating a multidisciplinary laboratory in space to enable high quality research in the microgravity setting.

Recommendation: Code U should develop a long-term science plan that includes its advisory committee members, key Headquarters staff as well as appropriate external experts to develop a plan for prioritization of science on ISS. This long-term prioritization plan should be used to guide near-term decisions on resource allocations.

Budget Administration within Code U [non-NAC]

Finding: NASA is planning to move the budget of the ISS research program from Code M to Code U, effective at the beginning of fiscal year 2002. This move places the AA of Code U in the difficult position of allocating ISS research budget between internal Code U science and work that supports programs of other enterprises, including space science and earth science, as well as the international partners.

Recommendation: NASA should develop a process to ensure that appropriate scientific programmatic input from all affected parties is effectively weighed in deciding on the allocation of budget resources. BPRAC requests a report at the next meeting.

STS-107 Research Program [to NAC]**Finding:**

The STS-107 mission is of significant value to the overall research program of the Biological and Physical Research Enterprise. The mission complement includes research from all disciplines, including researchers from the International Partners, universities and industry. To date, STS-107 has been delayed fifteen (15) times since being manifested in 1999 (?). Each time that this has occurred, the Agency has significantly added to the total cost of the mission, including maintaining the commercial carrier workforce and the research programs. Biological and Physical Research has shouldered the cost of these slips even though the investigators and hardware have been ready to fly.

The National Research Council, National Academy/Space Studies Board and even Congress have supported the utilization of the Shuttle Program for providing access for research. The Congressional Appropriation of FY 2000 provided funding for a dedicated Life Science mission and mid-deck research opportunities.

Recommendation:

The Committee recommends that NASA raise the priority of microgravity research within the Agency and reconsider the policy of allocating delay cost to the science users. The STS-107 mission and shuttle opportunities should be provided immediately to the program. Any further delay will jeopardize the credibility of the science and continue to add to the expense of the research program.

Funding Increase for ISS Research [NAC]

Finding: There is a possibility that \$50 million will be restored for ISS research hardware in the FY02 budget. There is a concern that this may not extend beyond FY02. If this were the case, the completion of the facilities would be jeopardized.

Recommendation: We recommend that this initial increment to the budget be maintained in the out years to ensure that the facilities are completed and integrated into the ISS program.

NSBRI

Finding: The BPRAC received an excellent briefing on the NSBRI Review. The Institute seems well managed and successful in its early efforts on development of countermeasures.

Recommendation: The BPRAC requests a briefing on the NSBRI Strategic Plan. The BPRAC requests regular briefings on NSBRI and other NASA/Code U Institutes' research selections and mission metrics.

Critical Path Roadmap

[agenda item for next meeting]

BIOLOGICAL AND PHYSICAL RESEARCH ADVISORY COMMITTEE

NASA Headquarters

October 25-26, 2001

LIST OF PRESENTATION MATERIAL¹

- 1) Status of BPRAC Recommendations [Carpenter]
- 2) Presentation to Biological and Physical Research Advisory Committee [Olsen]
- 3) Fundamental Space Biology Division Update [Liskowsky]
- 4) Bioastronautics Research Division [Fogleman]
- 5) Research Integration/Space Product Development [Unran]
- 6) ISS Research [Olsen]
- 7) Briefing to the Biological & Physical Research Advisory Committee [Hedin]
- 8) OBPR Advisory Committee Discussion [Comstock]
- 9) National Space Biomedical Research Institute [Alford]
- 10) NSBRI Review Briefing to BPRAC [Olsen]

Other material distributed at the meeting:

- 1) NSBRI Presentation to Biological and Physical Research Advisory Committee
- 2) Office of Management and Budget—Remarks by Director Mitchell E. Daniels, Jr. at Conference Board Annual Meeting
- 3) Testimony of Sean O’Keefe, Deputy Director, Office of Management of Budget, to Committee on Appropriations Subcommittee on VA/HUD and Independent Agencies, US House of Representatives
- 4) Joint Meeting of the NASA LSAS and NASA-NIH Advisory Subcommittee
- 5) Down-to-Earth Space Research: Ensuring Health in Space and on Earth – NSBRI

¹ Presentation and other material distributed at the meeting is on file at NASA Headquarters, Code U, Washington, DC 20546.